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**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Paper No. 20031217

Application Number: 09/585,061
Filing Date: June 01, 2000
Appellant(s): NORVILLE ET AL.

James M. Durlacher
For Appellant

**EXAMINER'S ANSWER**



This is in response to the appeal brief filed August 11, 2003.

***(1) Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

***(2) Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

***(3) Status of Claims***

The statement of the status of the claims contained in the brief is correct.

***(4) Status of Amendments After Final***

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

***(5) Summary of Invention***

The summary of invention contained in the brief is correct.

***(6) Issues***

The appellant's statement of the issues in the brief is correct.

***(7) Grouping of Claims***

Appellant's brief includes a statement that claims 1-19, 24-26 and 31-38 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

***(8) Claims Appealed***

The copy of the appealed claims contained in the Appendix to the brief is correct.

***(9) Prior Art of Record***

| | | |
|---|---|---|
| 5098487 | BRAUER ET AL | 3-1992 |

***(10) Grounds of Rejection***

Claims 1-19, 24-26 and 31-38 are rejected under 35 U.S.C. as being unpatentable over U.S. patent no. 5,098,487 to Brauer et al.

Brauer et al. shows a die casting method by cooling a molten metal in a vessel and stirring the same with either a mechanical means or an electromagnetic means to form a semi-solid slurry, discharging the slurry into a casting chamber which contains insulated wall and may include an induction heating means (see col. 8, lines 17-50 and figure 6) and injecting the slurry in the casting chamber into a die cavity to form a casting. It would have been obvious that an induction heating means for heating the casting chamber is not required shall the insulated wall is sufficient to prevent solidification of the slurry prior to the same being injected into the die cavity. With respect to claims 2-8 and 26, the specific casting cycle time for a particular alloy system depending on the molten metal composition, the grain size of the solid and the solid fraction in the slurry and thus the final product to be obtained, the cooling rate, the balance between the acceptable quality of the product and the cost, etc., and thus would have been obvious for those of ordinary skill in the rheocasting art to obtain the optimal casting cycle time through routine experimentation. With respect to claims 9 and 16, it would have been obvious to use a transferring device for delivering molten metal to the vessel when the molten metal was melted at different location than the caster. Since it is nowadays to use robot to replace the manual work for carrying out the routine operation, it would have been

obvious to use a robot for transferring molten metal in the process of Brauer et al. to facilitate the casting process. With respect to claims 10 and 13, it would have been obvious to set up the stirring system 58 of Brauer et al. ready for processing the molten metal before pouring the same therein and thereby to speed up the casting process. With respect to claims 11, 12, 14, and 15, it is a common knowledge that the heat transfer process can be regulated through the use of cooling means, heating means or insulating means. Thus, it would have been obvious to regulate the cooling rate of molten metal in the vessel of Brauer et al. through the use of cooling means, heating means, or insulting means. It is a common practice to use robot to replace the manual work for carrying out the routine operation. With respect to claims 17 and 18, it is a common practice to electromagnetically stir the molten metal to cause the same to flow either circumferentially or longitudinally (see applicant's admitted prior art as set forth in junction paragraph between pages 7 and 8 of the specification) to obtain a designated result. With respect to claim 19, it is conventional to add reinforcement particles into molten metal before casting such that to form a metal matrix composite article if the composite article is designated. With respect to claim 31-34, it would have been obvious to change any power supply parameter to control the strength of the EM field in response to the required strength of the stirring force and thereby to regulate the shear rate in the molten metal for forming the designated configuration of the solid particle in the slurry. With respect to claims 35 and 36, it is conventional to provide a cover in a EM stirring

apparatus for preventing molten metal from spilling out of the apparatus during stirring. Further, it is a common practice to use a temperature sensing means to detect the molten metal temperature in the vessel such that to regulate the casting process. With respect to claim 38, since it is convention to use different type of electromagnetic stirrer for generating a flow in either transverse or longitudinal direction (as admitted in the junction paragraph between pages 7 and 8 of the specification), it would have been obvious to arrange any combination of different type of conventional stirrers and thus to create more turbulent flow pattern and thereby to obtain a synergetic result.

***(11) Response to Argument***

a) With respect to attorney's request for interview through a conference call after final office action (page 6 of the brief), the attorney's attention is directed to MPEP 713.09 wherein it states that the interviews after final rejection merely to restate arguments of record or to discuss new limitations which would require more than nominal reconsideration or new search should be denied. Accordingly, the SPE's action is deemed to be proper.

b) In page 14, last paragraph through page 16, second paragraph of the brief, appellant argued that the Examiner has not provide the requisite showing of suggestion or motivation to modify the teachings of Brauer et al. to the claimed invention in order to support the obvious conclusion. However, as stated in the final office action, Brauer et al. disclose (col. 8, lines 35-46) that the casting chamber 70 contains insulated walls 72 and **may** (emphasis added) include an

induction heating means to prevent solidification of the slurry. The Examiner further stated that it would have been obvious to those of ordinary skill in the casting art that an induction heating means is not required shall the insulted wall is sufficient to prevent solidification of the slurry. In other words, since Brauer et al. stated that it "**may**" (emphasis added) include an induction heating means for the casting chamber 70, it would have been obvious that the induction heating means is not required shall the insulation property of the insulated casting chamber wall is capable of substantially preventing the heat loss from the slurry as the slurry comes into contact with the casting chamber walls, i.e. the heating means can be spared (and thus to simply the design and cost) when the insulating walls alone is capable of performing the designated function. Thus, the Examiner did provide the motivation to modify the teaching of Brauer et al.

c) In the junction paragraph between pages 16 and 17 of the brief, appellant stated that in the instant process what is created and what is discharged into the shot sleeve is a "slurry billet" and that the Examiner only makes reference to discharging the "slurry". However, it is noted that in Brauer et al's process the molten metal is transferred from launder 56 into the stirring system 58, which includes a vessel and a stirring means, wherein a semi-solid slurry is produced. The stirring means may be mechanical such as auger or electromagnetic. The slurry is then discharged from an opening 66 in the bottom of the vessel into the casting chamber 70 (see col. 8, lines 17-46 as well as figure 6). In the instant process, the molten metal is transferred from vessel (launder) 38 into a stirring

system 40, which includes a vessel 42 and an electrical stator (an electromagnetic stirring means) 44, wherein a semi-solid slurry is produced. The slurry is then discharged from an opening in the bottom of the vessel 42 into casting chamber 70 (see page 13, lines 11-19 and figure 2 of the specification). Thus, the process of forming and discharging the semi-solid slurry into the casting chamber described in both Brauer et al and the instant application are identical, i. e. the semi-solid slurry discharged from Brauer et al and that of instant application is identical. Whether the semi-solid slurry is called as "slurry" or "slurry billet" is no thing more than a personal preference.

d) In page 17, 1st complete paragraph and page 23, 2nd complete paragraph to 3rd paragraphs of the brief, appellant stated that there is no mention in col. 8, lines 28-30 of Brauer et al's specification that there is any cooling of the alloy nor any cooling of alloy in the vessel. The appellant further stated that Brauer et al. actually teaches just the opposite and they teach to add heat in order to maintain the temperature in the stirring chamber. However, in Brauer et al. the molten metal is poured from launder 56 into a vessel in the stirring system 58 wherein the molten metal become semi-solid slurry. The molten metal in the vessel must be cooled below liquidus temperature (liquidus temperature is a temperature above which a metal is in liquid state and below which primary solid metallic dendrites precipitate out from the molten metal and forming a semi-solid state) in order to form a semi-solid slurry. How a semi-solid slurry can be obtained without cooling a molten metal to a solid-liquid coexisting temperature ? In

Brauer et al. the provision of the induction heating coil 64 for heating the metal in the vessel is to reduce heat loss such that a designated solid-liquid coexisting temperature of the metal in the vessel can be maintained. The function of the induction heating coil 64 in Brauer et al. is the same as that of the thermal jacket in the instant application, i. e. to reduce the heat loss of metal in the vessel. The only different is that the amount of heat loss in Brauer et al. can be regulated through regulating the power to the induction heating coil 64, while in the instant process the amount of heat loss can not be regulated through the use of thermal jacket. In other words, the use of induction heating means is an active method while the use of thermal jacket is a passive method for reducing the heat loss.

e) In the junction paragraph between pages 17-18 of the brief stated that the structure and method of figure 6 in Brauer et al. is seen as a gradual deposition of slurry from within the stirring chamber via opening 66 into the casting chamber. The appellant further stated that the process of Brauer et al. is a gradual process (or "gradual trickle" as stated in page 21, lines 17, 21) and time delay. However, it is noted that the scope of the claims or claim language does not address to those features or issues. Further, as stated in paragraph "c" supra, since the process of forming and discharging the semi-solid slurry into the casting chamber both in Brauer et al and the instant application are identical, i. e. the semi-solid slurry discharged from Brauer et al and that of instant application are identical, the process or the manner of deposition of slurry (slurry billet) into the casting chamber both in Brauer et al. and the instant application are the

same. One can not say that the slurry deposition process of Brauer et al. is gradual (gradual trickle) and time delay while that of instant application is not.

f) In the junction paragraph between pages 18 and 19 of the brief, appellant stated that in Brauer et al. the statement of "stirring means may be mechanical such as a the (sic) auger or an electromagnetic" does not constitute as a teaching of using electromagnetic means for stirring. Appellant's reasoning is that figure 6 of Brauer et al. does not show that feature since the word "electromagnetic" is only mentioned once. However, it is a common knowledge, as acknowledged by appellant in pages 4, 2nd complete paragraph through page 8 of the specification, that it is conventional to stir the molten metal by using either a mechanical stirrer or an electromagnetic stirrer. Thus, it is abundant clear to those of ordinary skill in the rheocasting art that Brauer et al does teach the use of an electromagnetic means for stirring the molten metal for forming the semi-solid slurry.

g) In page 19, last paragraph through page 24, 1st complete paragraph of the brief appellant reiterated the issues of related to "slurry billet", "gradual trickle". Those issues had been treated in paragraphs "c" and "e" supra. The appellant further stated that the quantity of the discharged slurry (slurry billet) of the instant process is a "single shot" while that of Brauer et al. is not. However, since the maximum required amount of slurry for completely filling a die cavity for producing a cast article is called a single shot slurry (slurry billet), there is no reason to provide an amount of slurry which is more than a single shot of slurry into a casting chamber or it becomes a waste. Thus, Brauer et al. does

discharge a single shot slurry into the casting chamber 70 in each cycle of injection die casting process as appellant did. Further, in page 20, 3rd paragraph of the brief, appellant stated that Brauer et al. does not mention the step of discharging the slurry billet directly and immediately (and "no holding", as stated in page 23, lines 1-2) into the shot sleeve. However, as shown in figure 6, the opening 66 of Brauer et al's vessel is aligned with the casting chamber opening and the slurry (slurry billet) is discharged directly and immediately, and without holding, into the casting chamber 70.

h) In page 21 1st complete paragraph of the brief, appellant insisted to use the mechanical stirring, instead of electromagnetic stirring embodiment to analysis the prior art teaching. Examiner's analysis with respect to the electromagnetic stirring embodiment had been treated in paragraph "f" supra.

i) With respect to the cycle time as mentioned in page 22, 1st and 2nd paragraphs and pages 24-26 of the brief, the specific casting cycle time for a particular alloy system depending on the molten metal composition, the grain size of the solid and the solid fraction in the slurry and thus the final product to be obtained, the cooling rate, the balance between the acceptable quality of the product and the cost, etc., and thus would have been obvious to those of ordinary skill in the rheocasting art to obtain the optimal casting cycle time through routine experimentation.

j) With respect to the argument as set forth in page 26, 2nd paragraph of the brief, it would have been obvious to set up the stirring system 58 of Brauer et al. ready

for processing the molten metal before pouring the same therein and thereby to speed up the casting process.

k) With respect to the argument as set forth in page 26, last paragraph and pages page 27, 1st paragraph of the brief, it is a common knowledge that the heat transfer process can be regulated through the use of cooling means, heating means or insulating means. Thus, it would have been obvious to regulate the cooling rate of molten metal in the vessel of Brauer et al. through the use of cooling means, heating means, or insulting mean. The function of the induction heating coil 64 in Brauer et al. is the same as that of the thermal jacket in the instant application, i. e. to reduce the heat loss of metal in the vessel. Thus, it would have been obvious to use either the heating means 64 of Brauer et al. or insulting thermal jacket to regulate the heat transfer of molten metal in the vessel depending how precise the regulation required.

l) With respect to the argument as set forth in page 28, 1st complete paragraph of the brief, it is a common practice to electromagnetically stir the molten metal to cause the same to flow either circumferentially or longitudinally (see applicant's admitted prior art as set forth in junction paragraph between pages 7 and 8 of the specification).

m) With respect to the argument as set forth in page 28, last paragraph of the brief, it would have been obvious to change the any power supply parameter to control the strength of the EM field in response to the required strength of the stirring

force and thereby to regulate the shear rate for forming the designated configuration of the solid particle in the slurry.

n) With respect to the argument as set forth in page 29, 1st complete paragraph of the brief, it is conventional (see, for example, appellant's admitted prior art, US 4,434,837, which is mentioned in page 8 of the specification) to provide a cover in a EM stirring apparatus for preventing molten metal from spilling out of the apparatus during stirring.

o) With respect to the argument as set forth in page 29, last paragraph of the brief, it would have been obvious to arrange any combination of different type of conventional stirrers (as set forth in junction paragraph between pages 7 and 8 of the specification) to obtain a synergetic result.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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December 22, 2003

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